ZERO BEAT

6-83

HAMPDEN COUNTY RADIO ASSOCIATION, INC

W1-QSL BUREAU SPRINGFIELD, MASS ARRL AFFILIATED, 35th YEAR

NEXT MEETING

The next HCRA meeting which is the annual banquet will be held on June 3, 1983, Friday evening commencing with hors d'oeuvres and non alcoholic punch served from 6:30-7:30. A sit down roast beef dinner with all the trimmings and dessert will promptly be served at 7:30. Tickets are available from directors and officers for $7.00 per person. Tickets will also be available at the door.

BANQUET

EDITOR'S RAMBLINGS

Since this is the last issue of ZB for the 82-83 season, I'd like to take this opportunity to thank all of those who have contributed to ZB, made suggestions, made trips to the printer to deliver and pick up ZB, collate and assemble ZB, printed labels, and..... Rather than to print a list of names to acknowledge thanks, I am taking this opportunity to say "THANKS"... you know who you are.....without all of you, putting out ZB would have been somewhat of a burden, but with everybody pitching in it didn't take much to put out an informative newsletter in a timely fashion every month.

73 and have an enjoyable summer,

Gent WA1CQF

ABOUT TRUTH TABLES

WHAT ARE TRUTH TABLES?

Well, first of all, a Truth Table is a 4x3 table consisting of boolean (logical) elements which can only take two values: T (true) and F (false). There is one such table for each boolean operator, commonly called: AND, OR, XOR (exclusive OR) and two others not included in many computer languages. (There is also a 2x2 table called NOT.) The third column of each table shows the result of using the associated boolean operator on the boolean variables appearing in Column 1 and Column 2, jointly.

HOW ARE TRUTH TABLES USED?

Actually, most programmers who use any of the common high-level languages, can go through life without ever consciously using truth tables. Of course, the computer uses sub-routines based on them every time an 'IF . . .THEN. . .' clause appears in the program, although the programmer need never resort to one to write his conditional transfer statement. This is because any two expressions (e.g.Variables, Constants) separated by a boolean operation like 'greater than', 'less than' or 'equal to' is evaluated by the computer as a boolean variable having the value T or F (really 1 or 0), and that value controls the conditional transfer. Perhaps the best way to see how a Truth Table is applied is to watch how the computer algorithms work on 'IF . . . THEN . . .' clauses.

Single Variable:

IF A>5 THEN . . .

The variable A>5 is evaluated as F (really 0) if the current value of A is 5 or less, and as T (really 1) otherwise.

Two Variables:

IF A>5 AND A<=10 THEN . . .

The variable A>5 is evaluated as before. Then the variable A<=10 is evaluated as T if the current value of A does not exceed 10 (including all negative values!) and as F otherwise. Next, the computer goes to the AND algorithm (Truth Table) and reduces the two values to a single value, T or F, as determined by the AND-table. That final value controls the conditional transfer.

Multiple Variables:

IF (C<0 OR A<0) AND D>0 THEN . . .

First, the computer evaluates the variables C<0, A<0, D>0. Next it goes to the parenthesis and uses the OR algorithm to reduce the parenthesis as a whole to a value T or F. Finally, it uses the AND algorithm to reduce the two remaining variables to a single T or F which controls the conditional transfer.

The parenthesis around the OR operation is required if that is what is really meant. Otherwise, AND has precedence and the computer acts as if it were written:

IF C<0 OR (A<0 AND D>0) THEN . . .

which is something quite different. (Your manual will tell you the precedence of the boolean operators.)

OTHER APPLICATIONS

Boolean algebra has other important applications, as, for instance, ia Assembly Language, where it is applied to each bit in a byte to provide masks. The use of Truth Tables is always the same, however, and once learned, has general application.

Bert, WB1DTZ

TIDBITS

KA1HAA passed Technician, fb, Barb!...W1KK had his picture in QST... KA1GIP passed advanced, now Russ is working on Extra, he'll be at Field Day to bone up on operating skills...IARU Radiosport Contest is the weekend of July 9-10. Exchange report and ITU zone. (ours is 008)... A SIG means Special Interest Group: Did you work Norm or Jean?

SIG: **HAM RADIO GROUP**
Chairman: James E. Hassler
Address: 2203 Park Avenue
Orchard Valley
Cheyenne, Wyoming 82007 U.S.A.
Phone: (307) 632-4934

Stated Goals and Activites:

a. The HAM SIG is probably the most active and oldest SIG, and was in fact established before the International Apple Core. It meets every Sunday night at 0100GMT on 14.329MHZ. The Chairman acts as Net Control and since inception has never missed a Sunday night. The main goal of the HAM SIG is to inform Hams and Short Wave Listeners of the latest available software and peripherals for the Apple Computer and to exchange information with others on the latest software and hardware. To date more than six hundred Hams with Apple Computers have checked onto the Net (not including the number that merely listen).

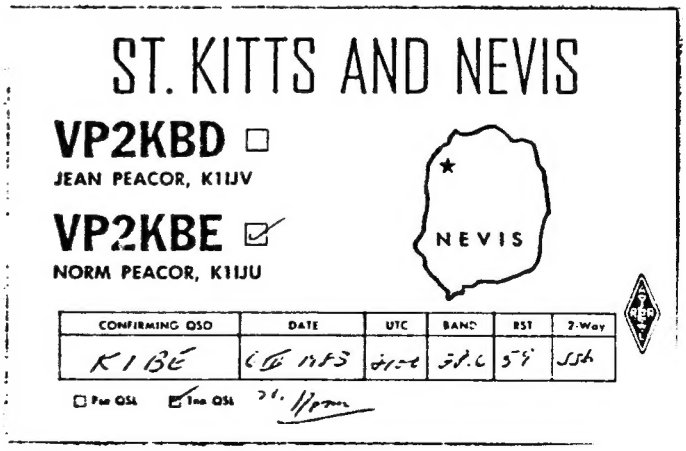


Table 1-1. JAN Nomenclature System.

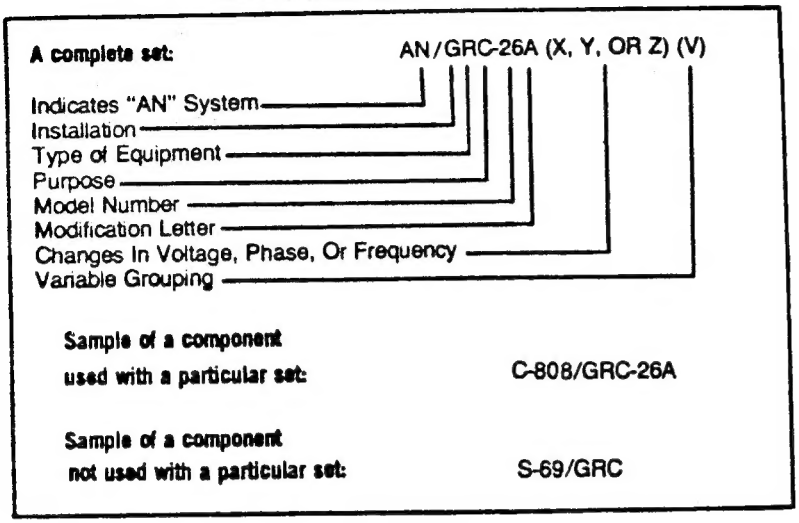


Table 1-2. JAN Set/Equipment Indicator Letters.

Installation	Type Of Equipment	Purpose
A-Airborne	A-Invisible Light, Heat Radiation	A-Auxiliary Assemblies
B-Underwater	B-Pigeon	B-Bombing
C-Air Transportable	C-Carrier	C-Communications
D-Pilotless Carrier	D-Radiac	D-Direction Finding
F-Fixed	E-Nupac	E-Ejection/ Release
G-Ground, General	F-Photographic	G-Fire Control
K-Amphibious	G-Telegraph/ Teleprinter	H-Recording
M-Ground, Mobile	I-Interphone/PA	L-Searchlight Control
P-Pack, Portable	J-Electro-Mechanical	M-Maintenance and Test Assemblies
S-Water, Surface Craft	K-Telemetering	N-Navigational Aids
T-Ground, Transportable	L-Countermeasures	P-Reproducing
U-General Utility	M-Meterological	Q-Special or Combination of Purposes
V-Ground Vehicular	N-Sound In Air	R-Receiving
W-Water, Surface Or Underwater	P-Radar	S-Detecting/ Range Bearing
	Q-Sonar	T-Transmitting
	R-Radio	W-Control
	S-Special Types	X-Identification and Recognition
	T-Telephone (Wire)	
	V-Visual	
	W-Armament	
	X-FAX or TV	
	Y-Data Processing	

MILITARY SURPLUS BARGAINS!!

Those old Korean War radios are popping up everywhere. And many other surplus bargains are out there in test equipment, meters, gauges, and radios. Six meter FM is used a lot by the military, and many radios covering 38-55mhz are now cheaply available. Portable handi-talkies like the PRC-6 are very easy to adapt to the ham service. A good book to pick up is "Using and Converting Surplus Gear", which gets into the nitti-gritty of many types of conversions. The following charts will help you to understand some of the nomenclature and the list will tell you who to write away to for catalogs. Good Luck!

Table 1-3. Retail Surplus Outlets.

Name	General Inventory
Barry Electronics 512 Broadway New York, NY 10012	Complete assemblies, also transformers, crystals, transistors, diodes, and other parts.
Theodore E. Dames Co. 308 Hickory Street Arlington, NJ 07032	Parts and i-f filters.
Fair Radio Sales Co. PO Box 1105 1016 E. Eureka Street Lima, OH 45802	Complete assemblies, also transformers, crystals, transistors, diodes, and other parts. Some computer surplus available.
Gregory Electronics Corp. 249 Route 46 Saddlebrook, NJ 07662	Surplus commercial FM gear and parts.
John Meshna, Jr. Box 62 E. Lynn, MA 01904	Some complete assemblies, also transformers, crystals, transistors, diodes and other parts.
Poly Paks Box 942 Lynnfield, MA 01940	Complete assemblies and parts.
C & H Sales Co. 2176 E. Colorado Blvd. Pasadena, CA 91107	Transformers, transistors, diodes, motors, tools, and other parts

On Ssb Radio Communications

By John S. Belrose*

Single-sideband (ssb) modulation has been largely ignored for mobile radio in the vhf and uhf bands, although its application for this service was proposed some 25 years ago (ref. 1) and its use has grown very rapidly in similar bands used by radio amateurs. However, this situation is likely to change. Narrow-band technology, amplitude-compandored single sidebaand (ACSB**) is indeed likely to take its place alongside fm in mobile radio communications. There are at least three companies in the USA gearing up for production, and extensive ssb studies have been conducted in the USA (ref. 2), at Philips Research Laboratories in Surrey, in the UK, and in Japan (ref. 3).

Actually, amplitude compandoring is only a part of this new technology, and not all researchers agree that amplitude compandoring is necessary. The required high-frequency stability (±20 Hz, although ±50 Hz is good enough), the rapidly fading signal, requiring agc time constants on the order of 20 ms, and the relatively poor performance in early ssb receivers in the presence of even modest levels of igition noise has, until recently, discouraged the use of ssb. Moreover, it has become apparent, from some of these studies, that the narrower bandwidth of ssb compared with fm is not as real as might be supposed, because of the limited rejection of the unwanted sideband achieved in practical transmitters, especially when modulated by speech. Rejections of 50 dB are not adequate to free the adjacent channel for use in the same location, and so the number of available channels would not increase in proportion to the nominal reduction in occupied bandwidth.

The New Technology

The basis of the new technology is actually fairly straightforward. The problems with good agc characteristics, and frequency lock for ssb reception can be overcome by transmitting a "pilot signal," and various forms of such signaling have been evaluated, including pilot carrier, tone-in-band, tone-above-band, analog Lincompex and digital Sycompex***. The first three were found to be very similar and the latter provide signal-to-noise enhancement through amplitude compression and expansion. That is an advantage that is also achievable using much simpler circuitry since ICs are available that provide a 2:1 amplitude compression and amplitude expansion, it being necessary only to set the threshold before expansion.

The "convenience circuits" developed by Bruce Lusignan (ref. 4) are the basics for this technology which is best described, although complete circuitry is not given, in his reports. A pilot tone-above-band is transmitted (about 3 kHz at a power level of -13 dB below peak power). To facilitate positive frequency lock in the presence of various tone signaling that may be employed for radio-selective-call and radio-to-telephone interconnect, this pilot tone is frequency modulated by a 40-Hz tone. Furthermore, the most recent tests have shown that two stages of 2:1 amplitude compandoring, and pre-emphasis should be included, along with automatic microphone gain, automatic linearity, and control circuitry for agc and frequency lock. Compandoring gives at least 12 dB improvement over straight ssb, 10-15 dB improvement over fm; and ssb occupies 1/5th of the fm bandwidth.

Commercial Development

The ACSB design described above was done by Bruce Lusignan. VBC Inc. is licensed to develop an LSI chip that would incorporate all the features and circuitry developed at SRI. Johnson Radio are licensed to use the ACSB pc board designs, and they are presently developing an ACSB 900-MHz groun-air-ground communications system. Sideband Technology, Inc. (ref. 5), following the available information in the SRI reports have (apparently) developed their own version of the Lusignan convenience circuitry and have manufactured prototype ACSB transceivers for the 150-174 MHz range. These transceivers are presently not for sale, but numbers of them are presently undergoing user-evaluation trials, in Indiana by Standard Oil, in Canada by CP Rail (in the Hawkesbury, Ontario area) and probably elsewhere. Subsequent trials will be conducted in Canada by Bell Canada, the Department of Transport and the Communications Research Centre. An ACSB transceiver is also being developed by Stephens Engineering Assoc. Inc., Mountlake Terrace, WA, but little is known about this transceiver at present, except that it will be a 16-channel 30-watt unit. The Stephens Eng. transceiver will also be evaluated and field-trialed by CRC later this year.

The availability of the ACSB LSI chip is unknown. But when developed, it should have wide application for mobile radio communications because it would be relatively easy to incorporate it into ssb equipment.

Ssb Technology in the Amateur Radio Service

A number of mobile radio transceivers are currently available manufactured by ICOM, Yaesu, Kenwood and others. The 2-m transceivers can be translated to 70 cm and 23 cm rather easily by employing linear-frequency transverters manufactured by Microwave Modules, Liverpool, UK. The agc circuitry has, however been optimized for base-station application, but results of tests show that performance is adequate at normal vehicle speeds (at 146 MHz), and the frequency stability, using a TCXO seems adequate for the amateur service. Communication tests carried out by CRC employing an ICOM 251AE revealed that the characteristic "popping" of fm communications at distances near the limiting range was entirely absent employing ssb. They also showed that the distance to which ssb communications extended well exceeded (for the same peak power) the range for standard fm with ±5-kHz deviation. At low signal levels, the quality of the transmission (in the writer's view) is acceptable and more comfortable to listen to than weak fm signals with loud noise bursts. The fm radio, however, provides a more natural-sounding voice due to its wider audio bandwidth.

The ACSB LSI chip when available should be adaptable for use with these types of radio amateur transceivers, permitting amateurs to experiment with ACSB.

*Communications Research Centre, P.O. Box 11490, Station "H," Ottawa, Ontario K2H 8S2, Canada.

**ACSB is a registered trademark of Sideband Technology, Inc., Rochester, NY.

***The digital version of Lincompex, named Syncompex was invented by Sherman Chow, at the Communications Research Centre, and is presently licensed to industry (Miller Communications). Applications to date however have been for hf-ssb communications.

Some Thoughts on Radio-Frequency Interference

Over the past several years, I have been reading articles and letters in the personal and professional computer magazines about radio-frequency interference (RFI). Most of it was in reference to the Federal Communications Commission (FCC) Docket 20780, which was initiated in April 1967 to update rules concerning restricted radiation devices (i.e., Part 15 of the rules). The new rules went into effect, in steps, in July, 1980 and March 1981. These new rules caught many manufacturers of computer or other digital devices by surprise. Many had not dealt with radio reception or the FCC. The result was that most manufacturers of computer hardware had to begin a crash program to reduce RFI in their equipment to the new limits or stop manufacturing the items which didn't pass. It turned out that some were able to add shielding, bypasses and chokes to make their equipment acceptable.

Nearly all of the published articles tended to characterize the FCC as the "heavy" in this matter. The reasoning went that "here we were producing this lovely computer, then the big, bad FCC came along and made us add some useless emission-control devices which only raised the price of the product." I don't remember reading anything like "what took the FCC so long to clarify limits on computer-generated RFI?"

All the FCC is asking of manufacturers is not to interfere with a neighbor's TV reception 10 meters away from the computer. Reasonable? For your neighbor, maybe, but not for your own radio or TV reception. Probably the worst case is a TV receiver used with a personal computer. Many will operate without interference. But, have you seen computers, still being sold, that produce displays with "worms" (wavy lines)? That likely is due to the use of a channel 3 on the TV to receive the computer-generated signal; harmonics of the transients in the computer show up on vhf TV channels.

As hams, we are interested in the interference that a computer might cause to Amateur Radio reception. In some cases, the computer could be in a room other than the shack for use by other members of the family. Then there's the computer in the shack. The FCC rules are not doing us too much good here, possibly just keeping the RFI down to a dull roar.

Some time ago, I tried to operate a pre-RFI-rules personal computer with a 2-meter transceiver which had a rubber ducky antenna. That was a disaster. The computer and the TV receiver got into the radio, making reception almost impossible except on very strong signals. The radio transmitter got into the computer and/or TV set, wiping out the display. The RFI ring-around was largely reduced by using an external antenna some 60 feet away from the equipment. Still, strong birdies were noted on numerous frequencies throughout the hf and vhf bands.

Then, I sold the computer, plastic box and all and started acquiring a new computer system. The first acquisition was a CRT terminal, in kit form, which happened to come with a plastic enclosure. Before assembling the case, I took it to a company near Philadelphia to have it sprayed with RFI shielding. It worked, to some extent. Interference to a TV receiver using rabbit ears some six feet away was noticeably reduced when the cover was closed on the terminal. However, a birdie in the 2-meter band could be heard 150 feet away. Nothing was done to reduce radiation through the CRT screen, and signal lines were not filtered. However, power-line filtering had been added. There is still work to be done on the terminal, but the shielding and filtering done thus far was worthwhile.

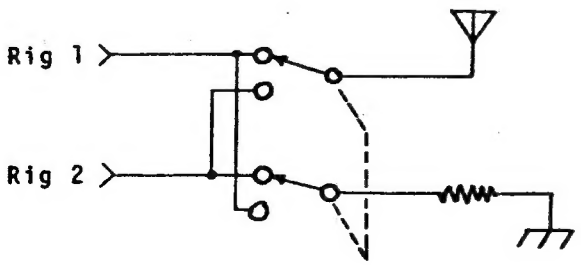
The new computer is in a metal box, as are the two 8-inch disk drives, a "must," because the computer is located in the shack. Cables between units have not yet been shielded or filtered, but that's in the plans. For the moment, it is at least acceptable with medium-strength birdies only a few places throughout the ham bands. No attempts have been made to search for and destroy any specific leaks.

I'm sure that QEX readers would be interested in articles on making computers safe for the ham shack. We need to have information on how to reduce emanations from personal computers which were not built with RFI reduction in mind (except to squeek by the FCC rules). It would also be useful to know how to design equipment for home-brew projects in order to eliminate RFI. I've seen some articles on pc board layout to minimize RFI in trade journals but very little on this subject in amateur literature. Are there any specific tests that one can perform to tell whether or not a digital device will cause unacceptable RFI to amateur equipment? Should there be any standards or design goals for digital equipment for the shack? The long data cables which interconnect computers, printers, terminals and radios make great antennas — can anyone design an RS-232-C cable using optical fibres? - W4RI.

DEC-QEX

Tune into a Load - For Sure!

If you're absent minded, as I am, and if you run a 100-watt rig, and a 5-watt rig on the same antenna, as I do - or, any two rigs with one antenna for that matter, you too may have tuned up one of the rigs into a zero load as I have. Obviously, this practice can be disasterous, especially if the rig is solid state. I have the problem eliminated now because I got a good ceramic double wafer switch, installed it in an aluminum box and hooked it up as indicated in the diagram. Now, when I have one rig on the antenna, the other rig is on the dummy load and vice versa. Thus, I can encourage my growing absent-mindedness without fear of wrecking my treasures.



One may use a switch with reverse contacts on the bottom of the one wafer. Personally, I feel better with the actual physical spacing that's possible with two wafers.

Wouldn't it be great if one of you experimenters could devise a technical means to determine the attenuation of various antenna and rig switching?

Seems to me that there is a real need for adding switching to some antenna tuners so as to allow switching to various antennas and even more important, to permit switching directly to the antenna (bypass tuner) with full use of the SWR-POWER meter. - John P. Hamilton, KB9UZ, 6050 North Oakley Ave, Chicago, IL 60659.

DEAR ASSOCIATED CLUB MEMBER:
THE INCLOSURE WAS SENT TO ME BY DICK, WB1HIH. PLEASE SEE THAT IT COMES TO THE ATTENTION OF THE CLUB MEMBERS. IT IS V E R Y IMPORTANT.

al W1YI, ACC.

SENATORS AND REPRESENTATIVES TO BE INVOLVED WITH FINAL DISPOSITION OF THE MT. GREYLOCK COMMUNICATIONS MONOPOLE ISSUE

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REFERENCE: CHAPTER # 652 - AN ACT RELATIVE TO MOUNT GREYLOCK - 1/5/83

SECTION 4. The joint legislative committees on public safety, and natural resources and agriculture, shall submit their recommendations for legislation regarding the future status of said radio tower and its use by said radio club, to the clerk of the house of representatives within sixty days of the submission of the report of said task force.
(The task force report was submitted on 4/29/83)

THESE JOINT COMMITTEES ACCOUNT FOR 30% OF ALL MASS SENATORS AND 14% OF ALL MASS REPRESENTATIVES WITH NO DUPLICATES.

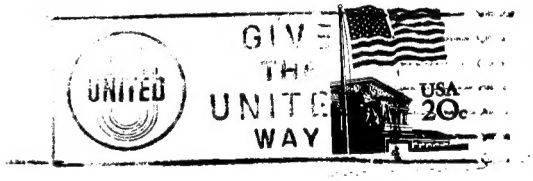
WHAT WE ARE LOCKING FOR IS THAT THE NORTHERN BERKSHIRE AMATEUR RADIO CLUB BE ALLOWED TO USE THE MONOPOLE AND NO LOOPHOLES ARE PUT INTO THE FINAL BILL THAT WOULD MAKE US GO THROUGH THIS HASSLE AGAIN. WE NEED THESE SENATORS AND REPRESENTATIVES TO BE OUR "WATCHDOGS" AND PROTECTORS AGAINST FUTURE ATTEMPTS OF BUREAUCRATIC SKULDUGGERY.

LETTERS OR PHONE CALLS WOULD BE MOST HELPFUL. LET THEM KNOW THAT YOU ARE A CONSTITUENT OF THEIRS. ADDRESS LETTERS TO "THE HONORABLE JOHN J. DOE, STATE HOUSE, BOSTON, MASSACHUSETTS 02133 ; DEAR SENATOR OR REPRESENTATIVE DOE:

D

Hampden County Radio Assn
WA1CQF, Gent Lam Editor
38 Porter St.
Springfield, Mass. 01104

June 1983 Zero Beat



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